

**IN THE CLAIMS**

Please amend the claims as follows:

1-28. (Cancelled)

29. (Original) A system for identifying events in a process, the system comprising:  
a controller coupled to sensors monitoring a process;  
a principal component analysis model receiving data from the sensors monitoring the process and reducing a number of variables associated with the data from the sensors, the model further comprising:

a training module that is run on historical data to create a pool of vectors with values for the variables, wherein the training module further creates clusters of bad actors from the values based on statistics and associates the clusters with known events; and

a run time module that receives incoming data from the sensors, calculates statistics, determines if events are occurring, and identifies clusters to identify events.

30. (New) The system of claim 29 wherein the run time module calculates statistics related to the principal component analysis model, determines and finds a nearest cluster of bad actors related to the event to identify the event.

31. (New) The system of claim 29 wherein the run time module identifies a sequence of cluster matches and correlates the sequence of cluster matches to known events.

32. (New) The system of claim 29 wherein the model further determines if a cluster needs to be split when new bad actors are added and splits the cluster into two clusters using a goodness of fit criteria.

33. (New) The system of claim 32 wherein the model determines if a new event category is encountered and broadens limits for the sequence of clusters.

34. (New) The system of claim 29 wherein a cluster is limited to a predetermined number of bad actors.

35. (New) The system of claim 29 wherein the statistics comprise Q and T2.

36. (New) The system of claim 29 wherein the model uses a feature scoring scheme to identify top contributors of bad actors.

37. (New) The system of claim 36 wherein the feature scoring scheme is based on rank, value, and percent of contribution to a Q-residual sensor to identify a relative importance.

38. (New) The system of claim 37 wherein the top-contributors are determined based on a majority percentage of the Q-residual.

39. (New) The system of claim 37, where the top-contributors are determined based on only the contributors with absolute values that are drastically different from values of other contributors.

40. (New) The system of claim 37 wherein the scoring scheme is based on predetermined limits.

41. (New) The system of claim 20 wherein, the limits are computed statistically through change point detection methods.

42. (New) The system of claim 36, wherein a predetermined minimum/maximum number of contributors are selected from rank, value, and percent of contribution to a Q-residual sensor to identify a relative importance.

43. (New) A system for identifying events in a process, the system comprising:
- means for monitoring a process via sensors;
  - means for receiving data from the sensors monitoring the process and reducing a number of variables associated with the data from the sensors to produce a principal component analysis model, the model further comprising:
    - means run on historical data for creating a pool of vectors with values for the variables, and creating clusters of bad actors from the values based on statistics and associates the clusters with known events; and
    - means for receiving incoming data from the sensors, calculating statistics, determining if events are occurring, and identifying clusters to identify events.